Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, DC

TSO-C115b

Date: 9/30/94

Technical Standard Order

Subject: TSO-C115b, AIRBORNE AREA NAVIGATION EQUIPMENT USING MULTI-SENSOR INPUTS

(a) Applicability.

(1) Minimum Performance Standard. This technical standard order (TSO) prescribes the minimum performance standard that airborne area navigation equipment using multi-sensor inputs must meet in order to be identified with the applicable TSO marking. Airborne area navigation equipment using multi-sensor inputs that are to be so identified and that are manufactured on or after the date of this TSO must meet the minimum performance standard of Section 2, RTCA, Inc. Document No. RTCA/DO-187, "Minimum Operational Performance Standards for Airborne Area Navigation Equipment Using Multi-Sensor Inputs," dated November 1984. Additionally, the equipment must meet the minimum performance standards applicable to any sensors included as a part of the multi-sensor system. Performance standards exist for VOR receivers (TSO-C40c), DME receivers (TSO-C66c), Localizer Receivers (TSO-C36e), Loran-C receivers (TSO-C60b), Omega receivers (TSO-C94a, TSO-C120), and Global Positioning System sensors (TSO-C129). Equipment for which there is no performance standard (e.g., inertial navigation systems) must demonstrate compliance with this TSO.

(2) Exceptions to RTCA/DO-187. The exceptions specified in this paragraph refer to RTCA/DO-187 only. Additional exceptions to other RTCA/DO documents may be contained in the TSO's listed above. For systems not containing a GPS sensor, the requirements of this paragraph take precedence over any conflicting criteria contained in the sensor TSO's mentioned above. For systems that wish to include and take operational credit for a GPS sensor, the requirements of Paragraph (a)(3) of this TSO take precedence over other conflicting criteria.

(i) Operation of Controls. Add the following requirement to Paragraph 2.1.4. of RTCA/DO-187: Controls shall be designed to maximize operational suitability and minimize pilot workload. Reliance on pilot memory for operational procedures shall be minimized.

(ii) Accessibility of Controls. Add the following requirement to Paragraph 2.1.5 of RTCA/DO-187: Controls that are normally adjusted in flight shall be readily accessible and properly labeled as to their function.

(iii) Sensor Interfaces. In lieu of Paragraph 2.1.6 of RTCA/DO-187, substitute the following requirement: The interfaces with other aircraft equipment must be designed such that normal or abnormal RNAV equipment operation shall not adversely affect the operation of other equipment nor shall normal or abnormal operation of other equipment adversely affect the RNAV equipment operation.

(iv) Control/Display Readability. In lieu of Paragraph 2.1.8 of RTCA/DO-187, substitute the following requirement: The equipment shall be designed so that all displays and controls shall be readable under all normal cockpit conditions and expected ambient light conditions (total darkness to bright reflected sunlight). All displays and controls shall be arranged to facilitate equipment usage.

NOTE: Limitations on equipment installations to ensure display readability should be included in the installation instructions.

(v) Maneuver Anticipation and Direct-To Function. Add the following requirements to Paragraph 2.1.10 of RTCA/DO-187.

1. The equipment shall provide the capability to fly from the present position direct to any designated waypoint. Access to this feature shall be by means of a single action by the pilot. Selection of the desired "TO" waypoint may require additional actions.

2. For systems approved for non-precision approaches, maneuver anticipation (turning prior to the "TO" waypoint) shall not be implemented at the missed approach fix or the missed approach holding fix.

(vi) Update Rate. Add the additional requirement as follows: Navigation information used for display shall be updated at an interval of 1.0 second or less.

(vii) Numeric Display Information. For equipment not incorporating a GPS sensor, in lieu of Paragraph 2.2.1.1.1 of RTCA/DO-187, substitute the following requirement:

1. For en-route and terminal modes, the equipment shall continuously provide either a numeric display (digital) or electrical output that meets the following requirements:

a. The display or output shall be accurate to 0.3 nautical miles (nm) up to $\pm$9.9 nm and 1.0 nm or 2% of the actual cross-track, whichever is greater, for distances beyond $\pm$9.9 nm, referenced to a centered CDI display.

b. Cross-track deviation to at least $\pm$20 nm (left and right). A minimum resolution of 0.1 nm up to $\pm$9.9 nm and 1.0 nm beyond shall be provided. The display may be pilot selectable.

2. If the equipment includes an approach mode, the display or output shall be accurate to 0.1 nm of the actual cross-track referenced to a centered CDI display when in the approach mode.

NOTE 1: While the numeric display need not be located with the non-numeric cross-track display (RTCA/DO-187, Paragraph 2.2.1.1.2) or in the pilot's primary field of view, flight technical error (FTE) can be reduced when the numeric display is integrated with the non-numeric display or is located within the pilot's primary field of view. Both digital cross track and track angle error have been shown to reduce FTE. This information should be displayed together (either within the main system display or remotely displayed near the non-numeric display) for better tracking performance.

NOTE 2: The use of non-numeric cross track data integrated with non-numeric track angle error data into one display may provide the optimum of situation and control information for the best overall tracking performance.

NOTE 3: The requirement to "reference to a centered CDI display" is to ensure that the difference between the cross-track deviation (non-numeric display) and the numeric display remains within the specified tolerances.

(viii) Waypoint Storage. In lieu of Paragraph 2.2.1.6 of RTCA/DO-187, substitute the following requirement:

1. The equipment shall provide the capability for entering, designating and storing at least the following numbers of discrete waypoints (including the waypoint in use).

	Type of Equipment	
Phase of Flight	To-From	To-To
En route	3	4
Terminal and Approach	8	9

2. If the equipment has an approach mode, it shall store the complete sequence of waypoints for a selected approach. The sequence of waypoints shall consist of at least the following:

a. Initial approach fix
b. Final approach fix
c. Missed approach point
d. Missed approach holding point

3. The equipment must be designed in such a manner that navigation database waypoint coordinates cannot be changed at any time. Selection of a particular approach procedure (consisting of its complete sequence of pre-stored waypoints and related sensor requirements) from a list of pre-set approaches may be accomplished when in the approach mode provided valid navigation data for the designated approach procedure is correctly displayed within 5 seconds of its selection. Waypoint coordinates, sensor selection (including GRI, triad, and TD correction factors associated with Loran-C equipment) may be included in the equipment data base or manually input (reference, Paragraph 2.2.1.5 of RTCA/DO-187).

(ix) Holding Pattern Maneuvering. Add the following requirement to RTCA/DO-187: The equipment shall provide the capability to proceed to a selected waypoint and fly on a specified inbound course to the waypoint with repeated crossing of the selected waypoint.

(x) Automatic Scanning of Sensors and Sensor Ground Facilities. Add the following requirement to RTCA/DO-187: Equipment that incorporates automatic scanning of various sensors and/or sensor ground facilities (such as multiple DME stations) shall only utilize information stored within an internal data base for automatic scanning. Pilot defined information may be used for manually selected update capabilities but shall not be used for automatic scanning features.

(xi) Failure/Status Indications. Add the following requirements to Paragraph 2.2.1.11 of RTCA/DO-187: The equipment shall enunciate inadequate or invalid navigation signals, sources, or displays within 30 seconds for en route and terminal and 10 seconds for approach mode operations. The annunciation shall be located in the pilot's primary field of view and capable of immediately getting the flight crew's attention. In the approach mode, an acceptable annunciation is a "flag" on the navigation display.

(xii) 2D Accuracy Requirements (95% probability). In lieu of the approach column of Table 2-1 of RTCA/DO-187, substitute the following requirement:

Error Type	Approach			
	Single VOR/DME		Other Sensor(s)*	
	XTK	ATK	XTK	ATK
Equipment (nm)	0.5**	0.5**	0.3	0.3
FTE (nm)	0.5	N/A	0.5	N/A
Total (nm)	0.7	0.5	0.6	0.3

* For systems that wish to include and take operational credit for a GPS sensor, paragraph (a)(3) of this TSO references TSO-C129 for additional performance criteria, including system accuracy.

** These accuracies are based on a collocated VOR/DME station at the supported airfield. If the single station is not located at the airfield then the accuracies should be based on the along-track and cross-track distance to the VOR/DME as shown below.

2D Accuracy Requirements, Equipment Utilizing Only a Single Collocated VOR/DME

			Along-Track Distance																	
			0	5	10	15	20	25	30	35	40	50	60	70	80	90	100	110	120	130
	0	xtk atk		0.6 0.6	0.8 0.6	1.1 0.6	1.4 0.6	1.7 0.7	2.0 0.7	2.3 0.8	2.6 0.8	3.2 0.9	3.9 1.0	4.5 1.0	5.2 1.1	5.8 1.2	6.4 1.3	7.1 1.4	7.7 1.5	8.4 1.6
	5	xtk atk	0.6 0.6	0.6 0.6	0.8 0.7	1.1 0.7	1.4 0.7	1.7 0.8	2.0 0.8	2.3 0.8	2.6 0.9	3.3 0.9	3.9 1.0	4.5 1.1	5.2 1.2	5.8 1.3	6.4 1.4	7.1 1.5	7.7 1.6	8.4 1.7
	10	xtk atk	0.6 0.8	0.7 0.8	0.9 0.8	1.1 0.8	1.4 0.9	1.7 0.9	2.0 0.9	2.3 1.0	2.6 1.0	3.3 1.1	3.9 1.2	4.5 1.2	5.2 1.3	5.8 1.4	6.5 1.5	7.1 1.6	7.7 1.7	8.4 1.8
	15	xtk atk	0.6 1.0	0.7 1.0	0.9 1.0	1.1 1.1	1.4 1.1	1.7 1.1	2.0 1.2	2.3 1.2	2.6 1.2	3.3 1.3	3.9 1.4	4.5 1.4	5.2 1.5	5.8 1.6	6.5 1.7	7.1 1.7	7.7 1.8	8.4 1.9
	20	xtk atk	0.6 1.3	0.7 1.3	0.9 1.3	1.2 1.3	1.4 1.3	1.7 1.4	2.0 1.4	2.3 1.4	2.7 1.4	3.3 1.5	3.9 1.6	4.6 1.6	5.2 1.7	5.8 1.8	6.5 1.9	7.1 1.9	7.7 2.0	8.4 2.1
Tangent Distance	25	xtk atk	0.7 1.5	0.8 1.5	1.0 1.6	1.2 1.6	1.5 1.6	1.8 1.6	2.1 1.6	2.4 1.7	2.7 1.7	3.3 1.7	3.9 1.8	4.6 1.9	5.2 1.9	5.8 2.0	6.5 2.1	7.1 2.1	7.8 2.2	8.4 2.3
	30	xtk atk	0.7 1.8	0.8 1.8	1.0 1.8	1.2 1.8	1.5 1.9	1.8 1.9	2.1 1.9	2.4 1.9	2.7 2.0	3.3 2.0	3.9 2.1	4.6 2.1	5.2 2.2	5.9 2.2	6.5 2.3	7.1 2.4	7.8 2.4	8.4 2.5
	35	xtk atk	0.8 2.1	0.8 2.1	1.0 2.1	1.3 2.1	1.5 2.1	1.8 2.2	2.1 2.2	2.4 2.2	2.7 2.2	3.3 2.3	4.0 2.3	4.6 2.4	5.2 2.4	5.9 2.5	6.5 2.5	7.1 2.6	7.8 2.7	8.4 2.7
	40	xtk atk	0.8 2.4	0.9 2.4	1.1 2.4	1.3 2.4	1.5 2.4	1.8 2.4	2.1 2.4	2.4 2.5	2.7 2.5	3.3 2.5	4.0 2.6	4.6 2.6	5.2 2.7	5.9 2.7	6.5 2.8	7.1 2.9	7.8 2.9	8.4 3.0
	50	xtk atk	0.9 2.9	1.0 2.9	1.1 3.0	1.3 3.0	1.6 3.0	1.9 3.0	2.2 3.0	2.5 3.0	2.8 3.0	3.4 3.1	4.0 3.1	4.6 3.2	5.3 3.2	5.9 3.3	6.5 3.3	7.2 3.4	7.8 3.4	8.4 3.5
	60	xtk atk	1.0 3.5	1.0 3.5	1.2 3.5	1.4 3.5	1.7 3.5	1.9 3.6	2.2 3.6	2.5 3.6	2.8 3.6	3.4 3.6	4.0 3.7	4.7 3.7	5.3 3.8	5.9 3.8	6.6 3.8	7.2 3.9	7.8 3.9	8.5 4.0
	70	xtk atk	1.0 4.1	1.1 4.1	1.3 4.1	1.5 4.1	1.7 4.1	2.0 4.1	2.3 4.1	2.6 4.2	2.9 4.2	3.5 4.2	4.1 4.2	4.7 4.3	5.3 4.3	6.0 4.4	6.6 4.4	7.2 4.4	7.9 4.5	8.5 4.5
	80	xtk atk	1.1 4.6	1.2 4.7	1.4 4.7	1.6 4.7	1.8 4.7	2.1 4.7.	2.3 4.7	2.6 4.7	2.9 4.7	3.5 4.8	4.1 4.8	4.7 4.8	5.4 4.9	6.0 4.9	6.6 5.0	7.3 5.0	7.9 5.0	8.5 5.1

90	xtk atk	1.2 5.2	1.3 5.2	1.4 5.2	1.6 5.2	1.9 5.2	2.1 5.3	2.4 5.3	2.7 5.3	3.0 5.3	3.5 5.3	4.2 5.4	4.8 5.4	5.4 5.4	6.0 5.5	6.7 5.5	7.3 5.5	7.9 5.6	8.6 5.6
100	xtk atk	1.3 5.8	1.4 5.8	1.5 5.8	1.7 5.8	1.9 5.8	2.2 5.8	2.4 5.9	2.7 5.9	3.0 5.9	3.6 5.9	4.2 5.9	4.8 6.0	5.4 6.0	6.1 6.0	6.7 6.1	7.3 6.1	7.9 6.1	8.6 6.2
110	xtk atk	1.4 6.4	1.5 6.4	1.6 6.4	1.8 6.4	2.0 6.4	2.3 6.4	2.5 6.4	2.8 6.4	3.1 6.5	3.6 6.5	4.2 6.5	4.9 6.5	5.5 6.6	6.1 6.6	6.7 6.6	7.3 6.7	8.0 6.7	8.6 6.7
120	xtk atk	1.5 6.9	1.6 7.0	1.7 7.0	1.9 7.0	2.1 7.0	2.3 7.0	2.6 7.0	2.8 7.0	3.1 7.0	3.7 7.1	4.3 7.1	4.9 7.1	5.5 7.1	6.1 7.2	6.8 7.2	7.4 7.2	8.0 7.3	8.6 7.3
130	xtk atk	1.6 7.5	1.7 7.5	1.8 7.5	2.0 7.6	2.2 7.6	2.4 7.6	2.6 7.6	2.9 7.6	3.2 7.6	3.7 7.6	4.3 7.7	4.9 7.7	5.6 7.7	6.2 7.7	6.8 7.8	7.4 7.8	8.0 7.8	8.7 7.9

NOTE 1: Equipment error assumes a waypoint input resolution of 0.01 minute, and output resolution of 0.01 minute for approach and 0.1 minute otherwise.

NOTE 2: The maximum difference between the displayed cross track deviation and the computed cross track deviation.

NOTE 3. Multi-sensor equipment accuracy shown in the above table does not necessarily satisfy accuracy requirements for operation in certain airspace. For example, navigation on published J and V routes requires the distance along-track from the tangent point and distance from the tangent point to VOR/DME to be less than approximately 50 nmi to meet airway width criteria.

NOTE 4. The above table is a result of an RSS combination of the below error elements. The accuracy tables are computed assuming that the waypoint is always at the tangent point and the aircraft is at the along-track distance measured from the same tangent point. This is important in the test procedures because the resulting cross-track error from the course setting is a function of distance to waypoint.

Ground Equipment Error:	Airborne Equipment Error:
VOR 1.4 degrees	VOR 3.0 degrees
DME 0.1 nmi	DME 0.2 nmi + 1%
	CSE 1.6 degrees
	Computation Error 0.5 nmi

(xiii) Cross-Track Deviation Display. In lieu of the cross-track deviation display test conditions of Table 2-5 of RTCA/DO-187, substitute the following requirements:

Route		
	Waypoint #1:	Latitude N 30^{o} 00.0'
	Waypoint #2:	Latitude N 31^{o} 00.0'
	Course:	360^{o} (true north)

Aircraft Position: N 30° 30.0'
W 80° 00.0'

Test Cond	WPT #1 & 2 Longitude	Nominal Deviation as Indicated on Non-Numeric Display	Cross-Track Deviation (nm)	Error Allowed in Numeric Display (nm)
1	W 79° 53.0'	Over 5 nm, left	6.0 left	0.3
2	W 79° 54.2'	5 nm, left	5.0 left	0.3
3	W 79° 57.1'	2.5 nm, left	2.5 left	0.3
4	W 80° 00.0'	Reference Point	0	0.3
5	W 80° 02.9'	2.5 nm, right	2.5 right	0.3
6	W 80° 05.8'	5 nm, right	5.0 right	0.3
7	W 80° 07.0'	Over 5 nm, right	6.0 right	0.3
8	W 80° 11.6'	Over 5 nm, right	10 right	1.0
9	W 79° 48.4'	Over 5 nm, left	10 left	1.0
10	W 80° 23.2'	Over 5 nm, right	20 right	1.0
11	W 79° 36.8'	Over 5 nm, left	20 left	1.0
12	W 79° 58.5'	1.25 nm, left	1.25 left	0.1
13	W 80° 01.5'	1.25 nm, right	1.25 right	0.1
14	W 79° 79.3'	0.6 nm, left	0.6 left	0.1
15	W 80° 00.7'	0.6 nm, right	0.6 right	0.1
16	W 80° 00.0'	Reference Point	0	0.1

NOTE: Conditions 1 through 11 are accomplished in the en route mode. Conditions 12 through 16 are accomplished in the approach mode.

(3) Use of Global Positioning System Sensors. RTCA/DO-208, "Minimum Operational Performance Standards for Airborne Supplemental Navigation Equipment Using Global Positioning System (GPS)," dated July, 1991, and TSO-C129, Airborne Supplemental Navigation Equipment Using Global Positioning System (GPS), provide standards for the use of GPS sensors (Class B and C) with multi-sensor navigation systems. These standards provide additional and, in some cases, contradictory requirements to the requirements of this TSO. Additional operational capabilities have been authorized for aircraft equipped with TSO-C129 compliant equipment. If the TSO applicant wishes to manufacturer equipment that is eligible for these additional operational capabilities, then the applicant must certify that the GPS sensor is compliant with TSO-C129. In this case the following criteria shall apply:

(i) All additional standards contained in TSO-C129 that apply to the appropriate class (B or C) of sensor being incorporated into the multi-sensor system must be complied with in addition to the requirements of this TSO.

(ii) The performance requirements of TSO-C129 take precedence over this TSO when the GPS sensor is being used for navigation. It is acceptable to revert to the criteria of this TSO when the GPS sensor is not installed or is otherwise not available. Reversion from TSO-C129 requirements to TSO-C115b requirements must be continuously in the pilot's primary field of view.

(iii) If any conflict is encountered between the two TSOs, TSO-C129 will always take precedence over TSO-C115b.

(iv) The requirements of TSO-C129 that are applicable to the multi-sensor system must be demonstrated as a part of demonstrating compliance with this TSO. All testing which would require inputs from a GPS sensor must be conducted with a sensor that has been demonstrated to meet the criteria of TSO-C129 for the class of sensor required by the multi-sensor system being evaluated. It is acceptable to simultaneously demonstrate compliance with TSO-C129 for the sensor and TSO-C115b for the multi-sensor system.

(4) Environmental Standard. The environmental test procedures specified in RTCA Document No. RTCA/DO-160C, “Environmental Conditions and Tests Procedures for Airborne Equipment” shall be used. RTCA/DO-160C is an updated version of RTCA/DO-160B, which is referenced in RTCA/DO-187. In all cases, references in RTCA/DO-160C to "Determine compliance with applicable equipment performance standards" are references to the standards found in RTCA/DO-187 and this TSO.

(i) After application of the test conditions of RTCA/DO-187 paragraph 2.4.13 and 2.4.14, including the power outage defined in RTCA/DO-160C, Section 16, the equipment should return to proper operation within 5 seconds.

(ii) In addition to the environmental tests identified in paragraph 2.4 of RTCA/DO-187, the following paragraph defines tests not included in RTCA/DO-160B: Lightning Induced Transient Susceptibility (RTCA/DO-160C, Section 22). The equipment shall be subjected to the test conditions specified in RTCA/DO-160C, Section 22, and shall meet the following requirements described in RTCA/DO-187 after application of the transient:

1. RTCA/DO-187, Paragraph 2.2.1.1 - Cross-Track Deviation Display

2. RTCA/DO-187, Paragraph 2.2.1. - Waypoint Distance Display

3. RTCA/DO-187, Paragraph 2.2.2 - 2D Accuracy Requirements

4. RTCA/DO-187, Paragraph 2.3.1.2 - Vertical Path Deviation

5. RTCA/DO-187, Paragraph 2.3.2 - VNAV Accuracy Requirements

(5) Software. If the equipment design includes a digital computer, the software must be developed in accordance with RTCA Document No. RTCA/DO-178B, "Software Considerations in Airborne Systems and Equipment Certification," dated December 1, 1992. In accordance with RTCA/DO-178B, the applicant must

submit a Plan for Software Aspects of Certification (RTCA/DO-178B, Paragraph 11.1) to the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration, having purview of the manufacturer's facilities, for review and approval.

NOTE 1: The Federal Aviation Administration (FAA) recommends that this plan be submitted early in the software development process. Early submittal will allow the applicant to resolve FAA issues with the Software Aspects of Certification Plan (e.g., partitioning, determination of software levels, etc.)

NOTE 2: The applicant should substantiate software levels in the safety assessment process outlined in RTCA/DO-178B. As an alternative to substantiating the software level(s) in a safety assessment, the applicant may develop all software that contains or affects navigation and integrity functions to at least the Level C criteria, as defined in RTCA/DO-178B.

(6) Coordinate Systems. RTCA/DO-187 refers to the WGS-72 ellipsoid as the most recent earth model in wide use. However, WGS-84 is more prevalent today, so that systems which require an earth model should use the WGS-84 ellipsoid.

(b) Marking. In addition to the marking specified in 14 CFR Part 21.607(d), the following information shall be legibly and permanently marked on the major equipment components:

(1) Each separate component of equipment that is manufactured under this TSO must be permanently and legibly marked with at least the name of the manufacturer and the TSO number.

(2) With regard to 14 CFR Part 21.607(d)(2), the part number is to include hardware and software identification, or a separate part number may be utilized for hardware and software. Either approach must include a means for showing the modification status.

(3) The software level or levels in accordance with RTCA/DO-178B.

NOTE: If multiple software levels are marked, then the installation instructions must clearly identify the software level for each function.

(4) For equipment which is found to meet the requirements of Paragraph (a)(3) of this TSO, TSO-C129 and the appropriate equipment class must also be marked on the equipment as specified in Paragraph (b)(1).

(c) Data Requirements.

(1) In addition to the submissions required by 14 CFR Part 21.605, the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration, having purview of the manufacturer's facilities, one copy each of the following technical data:

(i) Operating instructions.

(ii) Equipment limitations.

(iii) Installation procedures and limitations.

(iv) Schematic drawings as applicable to the installation procedures.

(v) Wiring diagrams as applicable to the installation procedures.

(vi) Specifications.

(vii) List of the major components (by part number) that make up the equipment system complying with the standards prescribed in this TSO.

(viii) An environmental qualifications form as described in RTCA Document RTCA/DO-160C for each component of the system.

(ix) Manufacturer's TSO qualification test report.

(x) Nameplate drawing.

(xi) The appropriate software documentation as agreed upon between the ACO having purview of the manufacturer's facilities and the applicant. As a minimum, the Plan for Software Aspects of Certification (RTCA/DO-178B, Paragraph 11.1) and the Software Accomplishment Summary (RTCA/DO-178B, Paragraph 11.20) will always be required to be submitted.

(2) In addition to those data requirements that are to be furnished directly to the FAA, each manufacturer must have available for review by the Manager of the ACO having purview of the manufacturer's facilities, the following technical data:

(i) A drawing list, enumerating all of the drawings and processes that are necessary to define the article's design.

(ii) The functional test specification to be used to test each production article to ensure compliance with this TSO.

(iii) Equipment calibration procedures.

(iv) Corrective maintenance procedures (within 12 months after TSO authorization).

(v) Schematic drawings.

(vi) Wiring diagrams.

(vii) The results of the environmental qualification tests conducted in accordance with RTCA Document RTCA/DO-160C.

(viii) The appropriate software documentation as agreed upon between the ACO having purview of the manufacturer's facilities and the applicant. The documentation available should be identified in the Plan for Software Aspects of Certification (RTCA/DO-178B, Paragraph 11.1) and the Software Accomplishment Summary (RTCA/DO-178B, Paragraph 11.20).

(d) Data to be Furnished with Manufactured Units. One copy of the data and information specified in Paragraphs (c)(1)(i) through (viii) of this TSO, and instructions for periodic maintenance and calibration which are necessary for continued airworthiness must go to each person receiving for use one or more articles manufactured under this TSO. In addition, a note with the following statement must be included:

"The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. The article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator."

(e) Availability of Reference Documents.

(1) Copies of RTCA Document Numbers RTCA/DO-160C, RTCA/DO-178B, RTCA/DO-208, and RTCA/DO-187 may be purchased from RTCA, Inc., 1140 Connecticut Avenue, Northwest, Suite 1020, Washington, DC 20036-4001.

(2) 17 CFR Part 21, Subpart O; Technical Standard Order TSO-C129, and Advisory Circular 20-110 (current revision), "Index of Aviation Technical Standard Orders," may be reviewed at FAA Headquarters in the Aircraft Certification Service, Aircraft Engineering Division (AIR-100), and at all regional ACO's.

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